# TRANSDUCTION

## USER'S MANUAL

Version: 1.1
07/30/08

## TR-990 INTEL CORE 2 DUO MOBILE FULL-SIZE

## PICMG 1.3 SBC FOR INTEL PROCESSOR

## SOCKET P

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# Packing List

Please check package component before you use our products.

## Hardware:

FS-A71 PICMG1.3 Full-Size CPU card x 1

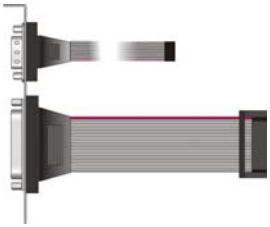
## Cable Kit:

**Floppy flat cable x 1**

**PS/2 Keyboard & Mouse cable x 1**

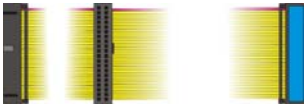
**4-pin to 3-pin ATX cable x 1**

**SATA cable x 2**



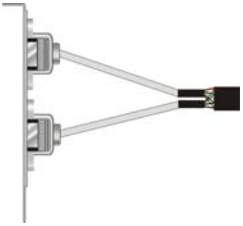
**DB25 & DB9 cable x 1**
**(FS-A71G-Only)**

**COM Port cable x 1**
**(FS-A71G2-Only)**



**ATA 100 x 1**

**Audio Port cable x 1**



**USB cable x 2**

**Printer cable x 1**
**(FS-A71G2-Only)**

## Other Accessories:

**Divers CD (Including User's Manual) x 1**

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# Chapter 1 - Introduction

## 1.1 Product Overview

**TR-990** is the Full-size single board computer with last Intel technology with PICMG1.3 form factor. Based on Intel® GME965 and ICH8-M, the board integrates a new Core 2 Duo / Celeron M Mobile processor 478-pin socket, DDR2 memory socket, Intel® Graphic Media Accelerator X3100 technology, Serial ATA II for a powerful system.

### Intel® Merom dual core Processor

The board supports Intel® Core 2 Duo ***socket-P*** processor with 533/667/800MHz front side bus, 4MB L2 cache, to provide more powerful performance than before.

### New features for Intel GME965 chipset

The board integrates Intel® GME965 and ICH8-M chipset, to provide new generation of the mobile solution, supports Intel® GMA X3100 graphics, DDR2 533/667MHz memory, Supports Intel® Flex Memory Technology built-in high speed mass storage interface of serial ATA, High Definition Audio with 2 channels surrounding sound.

### All in One multimedia solution

Based on Intel® GME965 and ICH8-M chipset, the board provides high performance onboard graphics,18/24-bit Single/dual channel LVDS interface, HDTV and High Definition Audio, to meet the very requirement of the multimedia application.

### Flexible Extension Interface

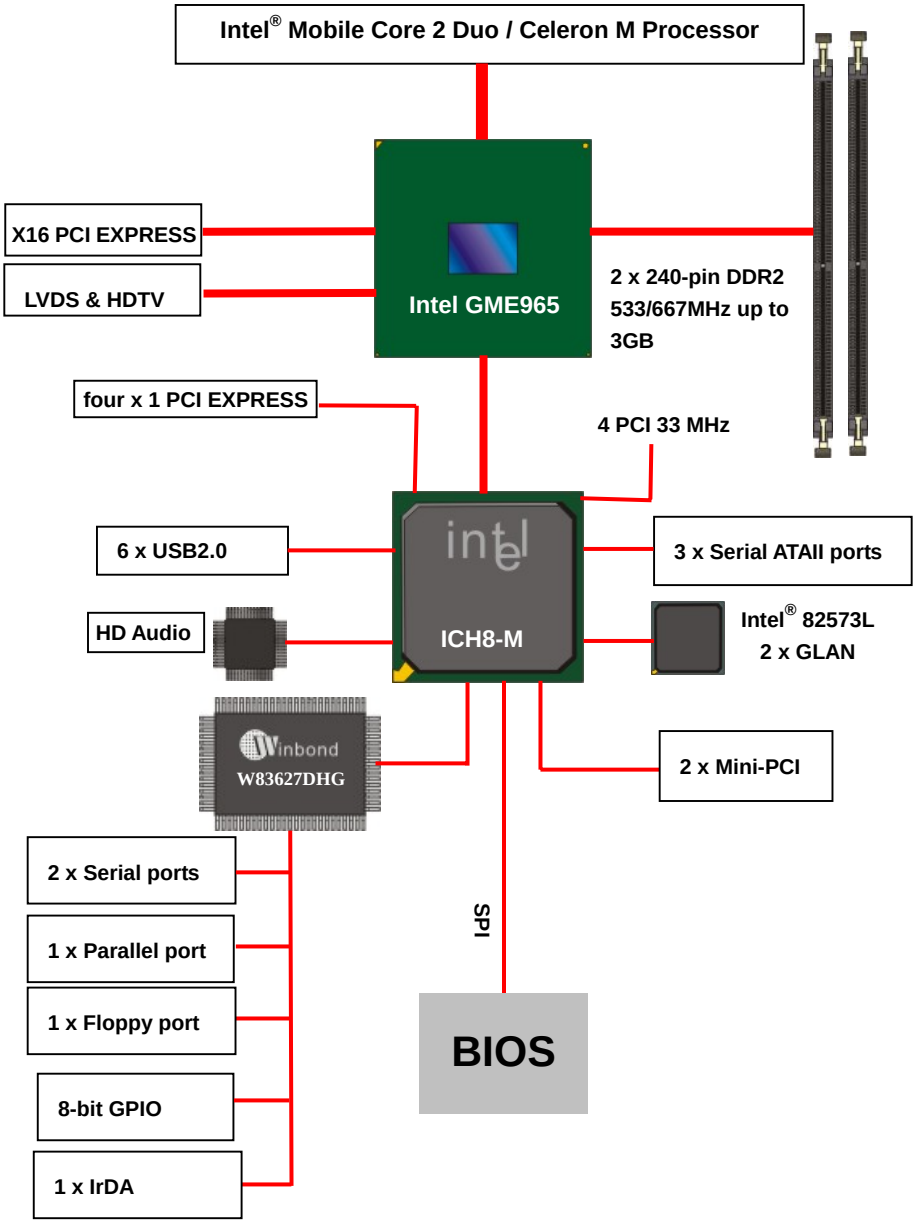
The board provides Compact Flash Type II slot, two mini-PCI slot.

## 1.2 Product Specification

| | |
|---|---|
| **General Specification** | |
| Form Factor | PICMG1.3 Full-size CPU Card |
| CPU | Support Intel® Core 2 Duo / Celeron M Mobile Processor<br>Package type: **Micro-FCPGA478** ***(Socket-P)***<br>Front side bus: 533/667/800 MHz |
| Memory | 2 x 240-pin DDR2 533/667MHz SDRAM up to 3GB with dual channel Interleaved mode<br>Unbufferred, non-ECC memory supported only |
| Chipset | Intel® GME965 (Northbridge) and ICH8M (82801HBM)(Southbridge) |
| BIOS | Phoenix-Award v6.00PG 8Mb SPI flash BIOS |
| Green Function | Power saving mode includes doze, standby and suspend modes.<br>ACPI version 1.0 and APM version 1.2 compliant |
| Watchdog Timer | System reset programmable watchdog timer with 1 ~ 255 sec./min. of timeout value |
| Real Time Clock | Intel® ICH8-M built-in RTC with lithium battery |
| Serial ATAII | Intel® ICH8-M integrates 3 Serial ATA II interface |
| **Multi-I/O Port** | |
| Chipset | Intel® 82801HBM(ICH8-M) with Winbond® W83627DHG controller |
| Serial Port | One RS-232 and one RS232/422/485 serial ports |
| USB Port | Six Hi-Speed USB 2.0 ports with 480Mbps of transfer rate |
| Parallel Port | One internal bi-direction parallel port with SPP/ECP/EPP mode |
| Floppy Port | One internal Floppy port |
| IrDA Port | One IrDA compliant Infrared interface supports SIR |
| K/B & Mouse | External PS/2 keyboard and mouse port on bracket |
| GPIO | One 12-pin Digital I/O connector with 8-bit programmable I/O interface |
| Smart Fan | One CPU fan connector for fan speed controllable |
| **VGA Display Interface** | |
| Chipset | Intel® GME965 GMA X3100 (Graphic Memory Controller Hub) |
| Display Type | CRT, LCD monitor with analog display, HDTV, LVDS |
| Frame Buffer | Up to 256MB shared with system memory |
| Connector | External DB15 female connector on bracket<br>Onboard 40-Pin LVDS connector<br>Onboard 9-Pin TV-out connector |

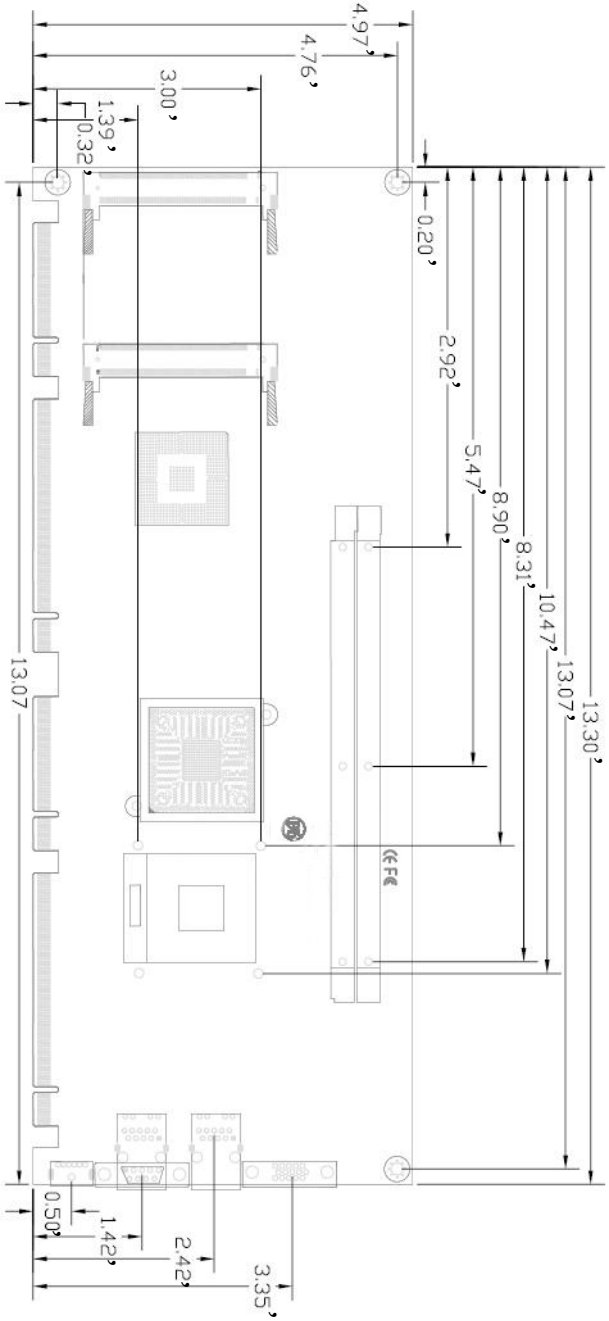
| | |
|---|---|
| **Ethernet Interface** | |
| Controller | Intel® 82573L Gigabit Ethernet controller |
| Type | Triple speed 10/100/1000Base-T<br>Auto-switching Fast Ethernet<br>Full duplex, IEEE802.3U compliant |
| Connector | Two External RJ45 connectors with LED on bracket |
| **Audio Interface** | |
| Chipset | Intel® ICH8-M with Realtek ALC888 HD Audio<br>Intel High Definition Audio compliance |
| Interface | 2 channels sound output |
| Connector | Onboard Audio connector with pin header<br>Onboard CD-IN connector |
| **Expansive Interface** | |
| Mini PCI | Two Mini-PCI socket **TYPE III A** (32-bit, 33MHz)<br>Power supply: +3.3V, +5V, 3VSB |
| PCI-Express | One X16 and Four X1 on PICMG 1.3 Interface |
| PCI | Four PCI bus master on PICMG 1.3 Interface |
| **Power and Environment** | |
| Power Requirement | +5V, +12V Requirement & optional $5V_{SB}$ for ATX |
| Dimension | 338 (L) x 126 (H) mm |
| Temperature | Operating within 0 ~ 60℃ (32 ~ 140℉)<br>Storage within -20 ~ 85℃ (-4 ~ 185℉) |

## 1.3 Block Diagram



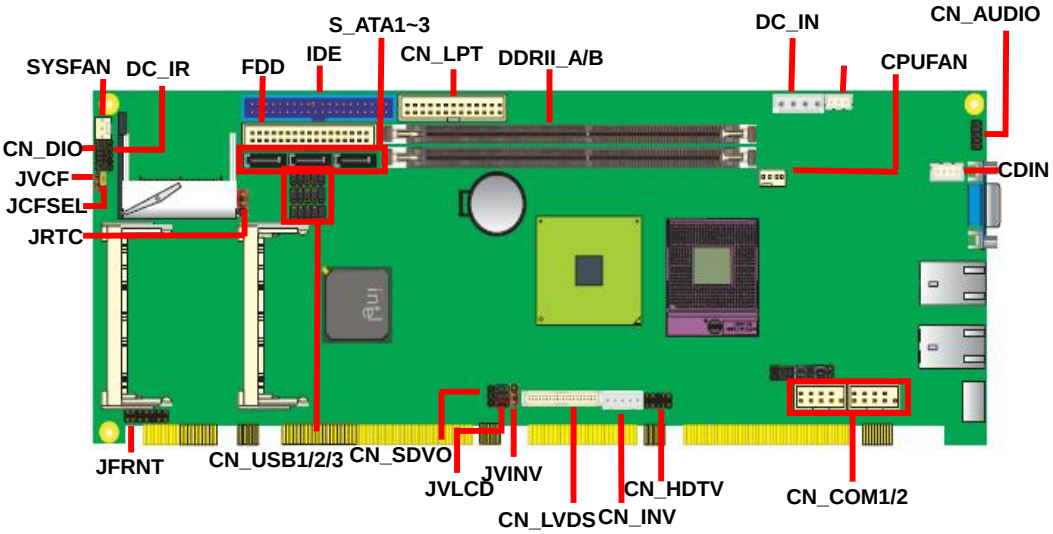
## 1.4 Mechanical Drawing

**Measurement: inch**



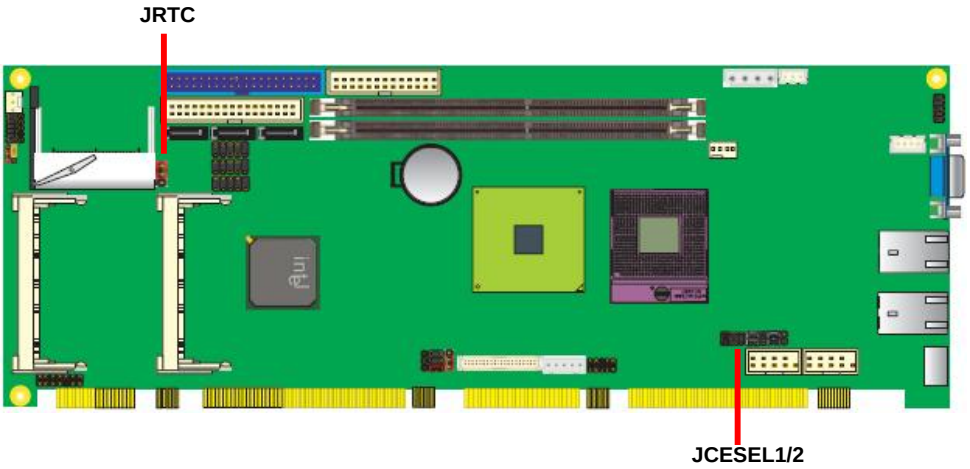
# Chapter 2 - Hardware Setup

## 2.1 Connector Location



## 2.2 Jumper Reference

| Jumper | Function |
|---|---|
| **JRTC** | CMOS Operating/Clear Setting |
| **JVINV** | LCD Inverter Voltage Setting |
| **JVLCD** | LCD Panel Voltage Setting |
| **JVCF** | CF Voltage Setting |
| **JCSEL1/2** | COM2 RS232/422/485 mode setting |
| **JCFSEL** | CF with IDE mode selection |



## 2.3 Connector Reference

### 2.3.1 Internal Connectors

| Connector | Function | Remark |
|---|---|---|
| DDRIIA/B | 240 -pin DDR2 SDRAM DIMM socket | Standard |
| FDD | 34-pin floppy connector | Standard |
| CN_LPT | 13 x 2-pin LPT connector | Standard |
| SATAII1/2/3 | 7-pin Serial ATA II connector | Standard |
| CN_AUDIO | 5 x 2-pin audio connector | Standard |
| CDIN | 4-pin CD-ROM audio input connector | Standard |
| CN_PS | 3-pin ATX function connector | Standard |
| DC_IN | 4-pin power supply connector | Standard |
| CN_DIO | 6 x 2-pin digital I/O connector | Standard |
| CN_USB1/2/3 | 10-pin USB connector | Standard |
| CPUFAN | 4-pin CPU cooler fan connector | Standard |
| SYSFAN | 3-pin system cooler fan connector | Standard |
| CN_IR | 5-pin IrDA connector | Standard |
| JFRNT | 14-pin front panel switch/indicator connector | Standard |
| Mini-PCI 1/2 | 124-pin Mini-PCI socket | Standard |
| CN_COM1/2 | 5 x 2-pin com connector | Standard |
| CF | Compact Flash TYPE-II socket | Standard |
| CN_HDTV | 5 x 2-pin HDTV interface | Standard |

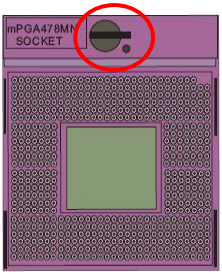
### 2.3.2 External Connectors

| Connector | Function | Remark |
|---|---|---|
| CRT | DB15 VGA connector | Standard |
| RJ45_1/2 | RJ45 LAN connector | Standard |
| COM | DB9 RS232 connector | Standard |
| PS2 | PS/2 keyboard and mouse connector | Standard |

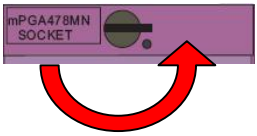
## 2.4 CPU and Memory Setup

### 2.4.1 CPU installation

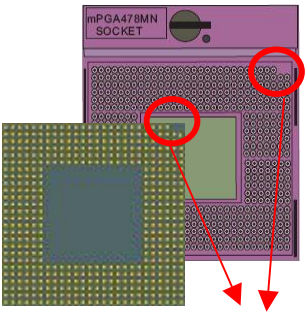
The board comes with the socket478 for Intel® Core 2 Duo/Celeron M **socket-P** processor only it supports new generation of Intel® Core 2 Duo/Celeron M **socket-P** processor with 533/667/800MHz of front side bus and 4MB L2 cache. Please follow the instruction to install the CPU properly.




**1. Use the flat-type screw drive to unlock the CPU socket**

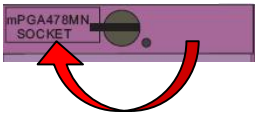



**Unlock way**




**Check point**

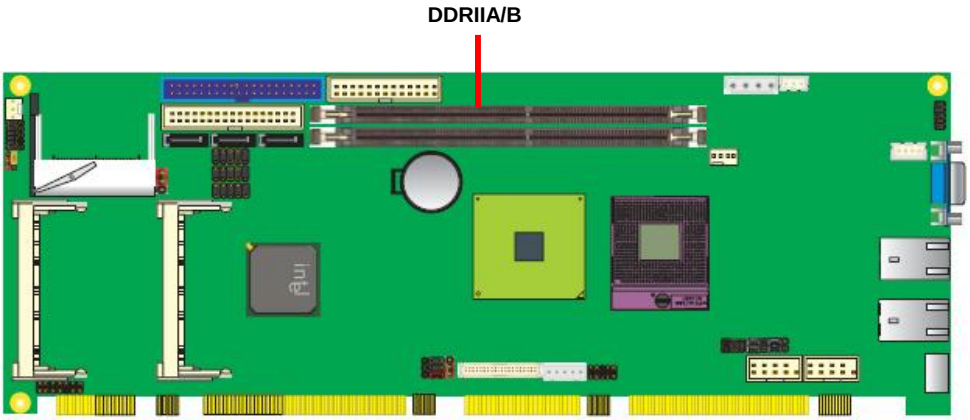
**2. Follow the pin direction to install the processor on the socket**

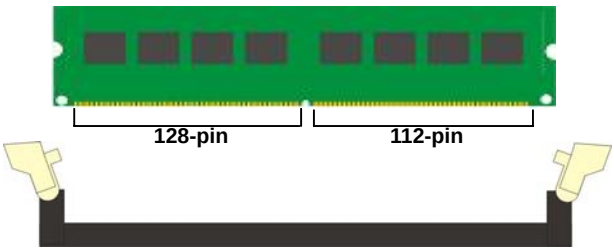



**3. Lock the socket**

## 2.4.2 Memory installation

**TR-990** has two 240-pin DDR2 DIMM support up to 3GB of memory capacity. The memory frequency supports 533/667MHz. Only Non-ECC supported unbuffered memory is supported only. Supports interleaved addressing in dual-channel memory configurations even when the two channels have unequal amounts of memory populated. This is called Intel® Flex Memory Technology. Flex memory provides higher performance with different sized channel populations than “Asymmetric” mode (where no interleaving is used) by allowing some interleaving.




**Please check the pin number to match the socket side well before installing memory module.**

## 2.5 CMOS Setup

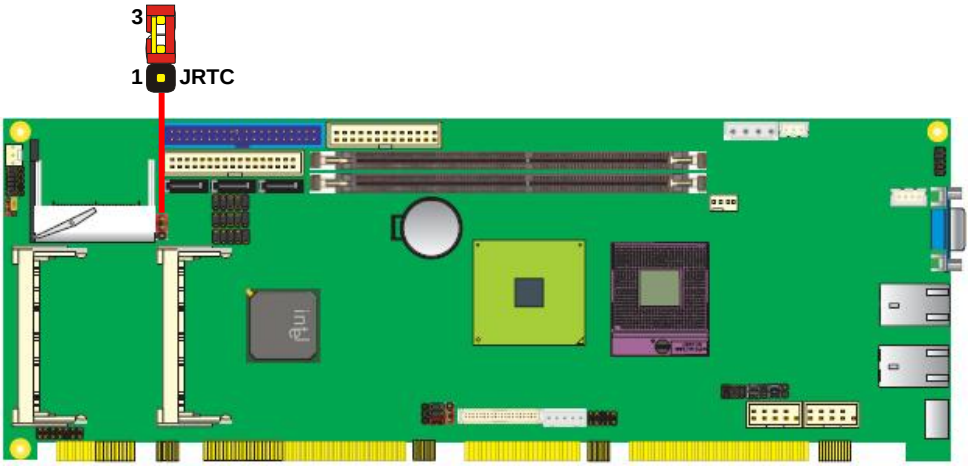
The board's data of CMOS can be setting in BIOS. If the board refuses to boot due to inappropriate CMOS settings, here is how to proceed to clear (reset) the CMOS to its default values.

Jumper: **JRTC**

Type: Onboard 3-pin Header.

| JRTC | Mode |
|---|---|
| 1-2 | Clear CMOS |
| 2-3 | Normal Operation |

Default setting



## 2.6 Enhanced IDE Interface

The board has one Ultra ATA100 IDE interface to support up to 2 ATAPI devices, or one ATAPI device and Compact Flash Type II socket, with jumper **JCFSEL** for IDE master/slave mode selection. And provide **JVCF** jumper to set +3.3V or +5V.

Jumper: **JCFSEL**
Type: onboard 3-pin header

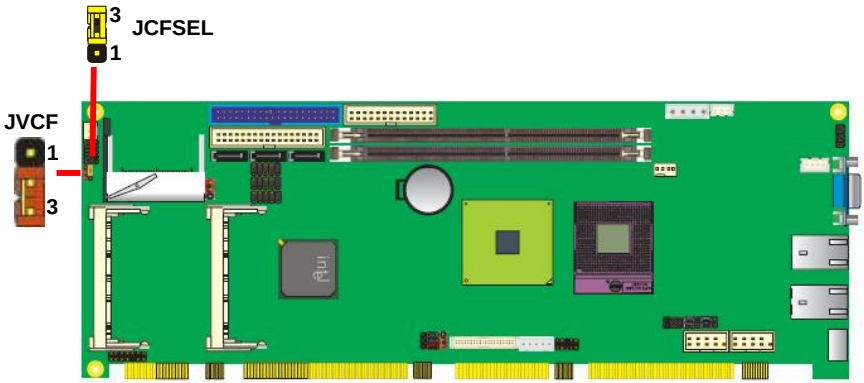
| JCFSEL | Mode |
|---|---|
| 1-2 | Master |
| 2-3 | Slave |

Default setting: 2-3

Jumper: **JVCF**
Type: onboard 3-pin header

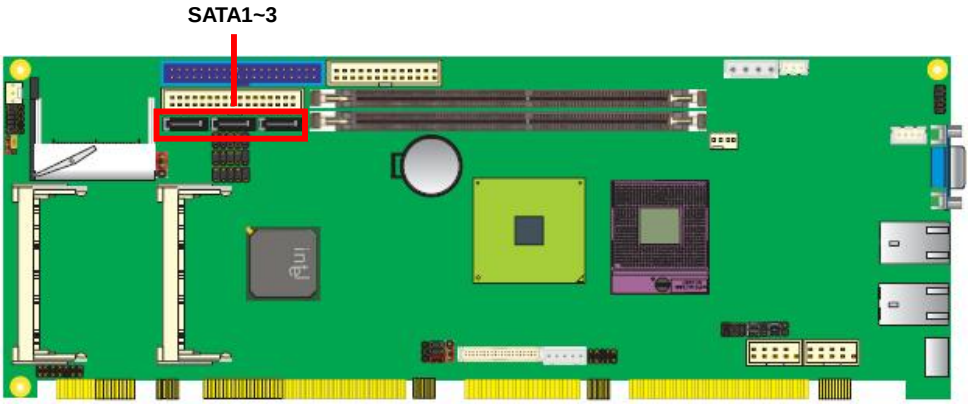
| JVSSD | Mode |
|---|---|
| | +5V |
| | +3.3V |

Default setting: 1-2



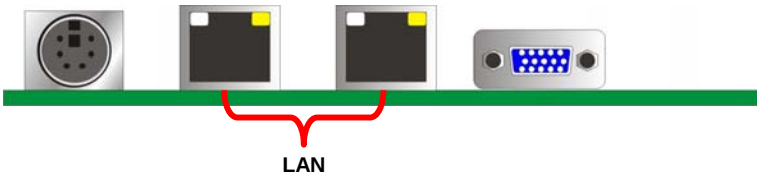
## 2.7 Serial ATA installation

**TR-990** has three Serial ATA II interfaces, the transfer rate of the Serial ATA II can be up to 300MB/s. Please go to http://www.serialata.org/ for more about Serial ATA technology information. For more about the system setup for Serial ATA, please check the chapter of SATA configuration.



## 2.8 LAN Interface

The Intel 82573L supports triple speed of 10/100/1000Base-T, with IEEE802.3 compliance and Wake-On-LAN supported.



## 2.9 Onboard Display Interface

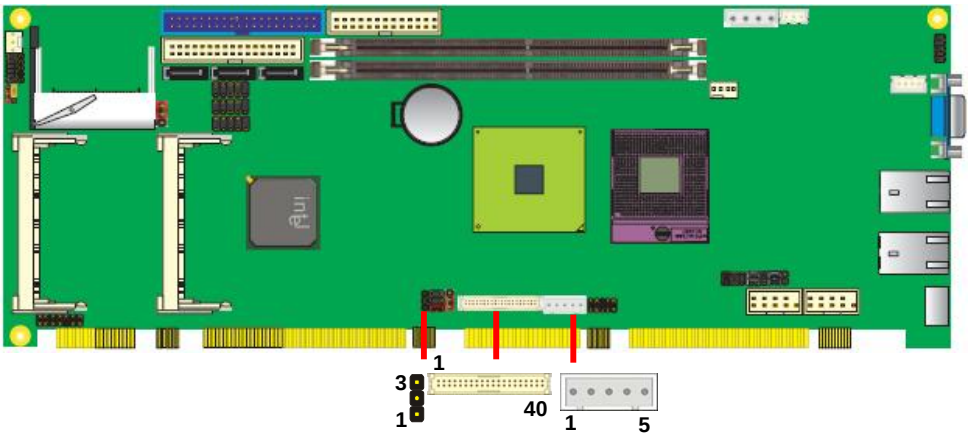
Based on Intel® GME965 chipset with built-in GMA (Graphic Media Accelerator) X3100 graphics, the board provides one DB15 connector on real external I/O port, and one 40-pin LVDS interface with 5-pin LCD backlight inverter connector. The board provides dual display function with clone mode and extended desktop mode for CRT and LVDS and TV-out.

### 2.9.1 Analog Display

Please connect your CRT or LCD monitor with DB15 male connector to the onboard DB15 female connector on bracket.

### 2.9.2 Digital Display

The board provides one 40-pin LVDS connector for 18/24-bit dual channel panels, supports up to 1600 x 1200 (UXGA) of resolution, with one LCD backlight inverter connector and one jumper for panel voltage setting



Connector: **CN_INV**
Type: 5-pin LVDS Power Header
Connector model: **JST B5B-XH-A**

| Pin | Description |
|---|---|
| 1 | INV-Vcc |
| 2 | GND |
| 3 | GND |
| 4 | GND |
| 5 | ENABKL |

Jumper: **JVLCD**
Type: 6-pin Power select Header

| Pin | Description |
|---|---|
| 1-2 | LCDVCC (3.3V) |
| 3-4 | LCDVCC (5V ) |
| 5-6 | LCDVCC (12V) |

Jumper: **JVINV**
Type: 3-pin Power select Header

| Pin | Description |
|---|---|
| 1-2 | INV_VCC (12V) |
| 2-3 | INV_VCC (5V) |

Connector: **CN_LVDS**
Type: onboard 40-pin connector for LVDS connector
Connector model: **HIROSE DF13-40DP-1.25V**

| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 2 | LCDVCC | 1 | LCDVCC |
| 4 | GND | 3 | GND |
| 6 | ATX0- | 5 | BTX0- |
| 8 | ATX0+ | 7 | BTX0+ |
| 10 | GND | 9 | GND |
| 12 | ATX1- | 11 | BTX1- |
| 14 | ATX1+ | 13 | BTX1+ |
| 16 | GND | 15 | GND |
| 18 | ATX2- | 17 | BTX2- |
| 20 | ATX2+ | 19 | BTX2+ |
| 22 | GND | 21 | GND |
| 24 | ACLK- | 23 | BTX3- |
| 26 | ACLK+ | 25 | BTX3+ |
| 28 | GND | 27 | GND |
| 30 | ATX3- | 29 | BCLK- |
| 32 | ATX3+ | 31 | BCLK+ |
| 34 | GND | 33 | GND |
| 36 | DDCPCLK | 35 | N/C |
| 38 | DDCPDATA | 37 | N/C |
| 40 | N/C | 39 | N/C |

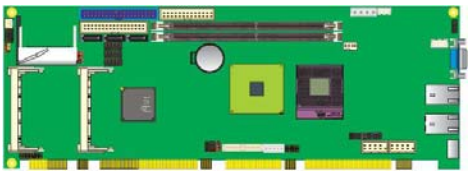
To setup the LCD, you need the component below:

1. A panel with LVDS interfaces.
2. An inverter for panel's backlight power.
3. A LCD cable and an inverter cable.

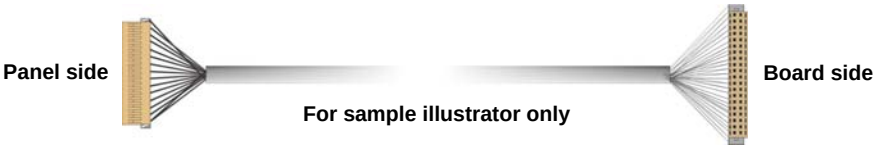
**For the cables, please follow the pin assignment of the connector to make a cable, because every panel has its own pin assignment, so we do not provide a standard cable; please find a local cable manufacture to make cables.**

## LCD Installation Guide:

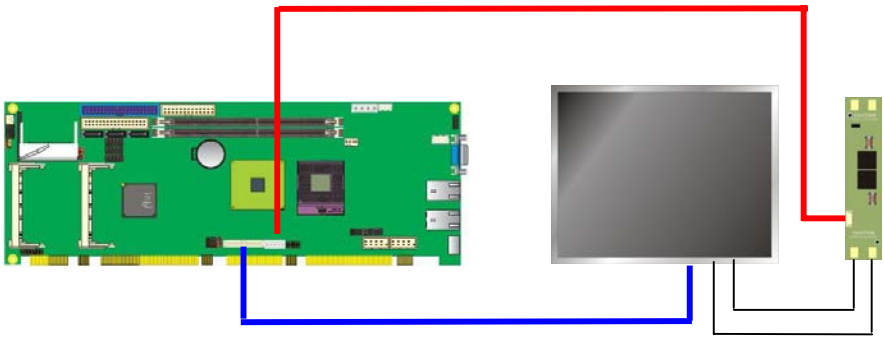
1. Preparing the **TR-990**, **LCD panel** and the **backlight inverter**.



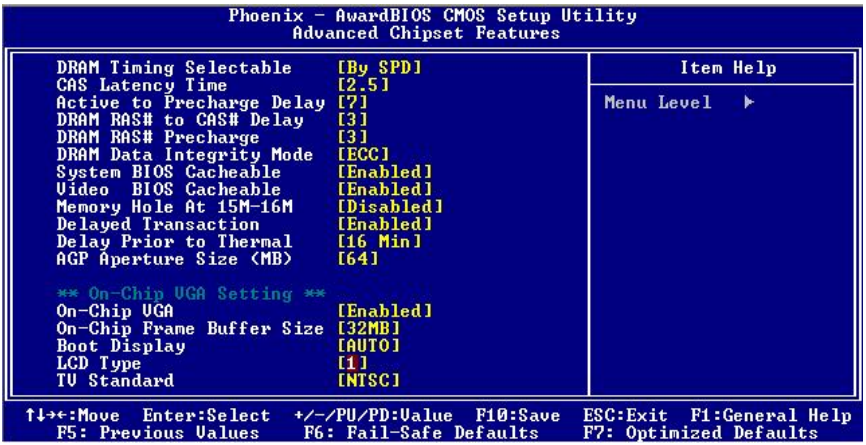
2. Please check the datasheet of the panel to see the voltage of the panel, and set the jumper **JVLCD** to +12V or +5V or +3.3V.
3. You would need a LVDS type cable.




4. To connect all of the devices well.



After setup the devices well, you need to select the LCD panel type in the BIOS.


Phoenix - AwardBIOS CMOS Setup Utility
Advanced Chipset Features
DRAM Timing Selectable [By SPD]
CAS Latency Time [2.5]
Active to Precharge Delay [7]
DRAM RAS# to CAS# Delay [3]
DRAM RAS# Precharge [3]
DRAM Data Integrity Mode [ECC]
System BIOS Cacheable [Enabled]
Video BIOS Cacheable [Enabled]
Memory Hole At 15M-16M [Disabled]
Delayed Transaction [Enabled]
Delay Prior to Thermal [16 Min]
AGP Aperture Size (MB) [64]
** On-Chip VGA Setting **
On-Chip VGA [Enabled]
On-Chip Frame Buffer Size [32MB]
Boot Display [AUTO]
LCD Type [1]
TV Standard [NTSC]
Item Help
Menu Level ▶
↑↓→←:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

The panel type mapping is list below:

| BIOS panel type selection form | | | |
|---|---|---|---|
| **18-bit Single channel** | | **24-bit Dual channel** | |
| **NO.** | **Output format** | **NO.** | **Output format** |
| 1 | 800 x 480 | 10 | 1024 x 768 |
| 2 | 800 x 600 | 11 | 1280 x 768 |
| 3 | 1024 x 768 | 12 | 1280 x 1024 |
| **24-bit Single channel** | | 13 | 1366 x 768 |
| 4 | 1024 x 768 | 14 | 1400 x 1050 @ 108Mhz |
| 5 | 1280 x 768 | 15 | 1600 x 1200 |
| 6 | 1280 x 800 | | |
| 7 | 1280 x 1024 | | |
| 8 | 1366 x 768 | | |
| 9 | 1600 x 1200 | | |

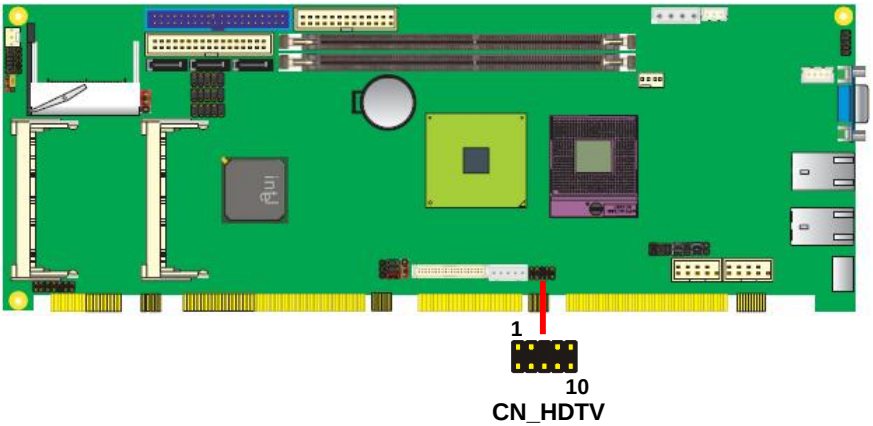
### 2.9.3 TV-out Interface

The board provides an HDTV interface with Intel® GME965, supports PAL and NTSC of TV system, and display (clone or extended desktop) function with CRT, LVDS.

Connector: **CN_HDTV**

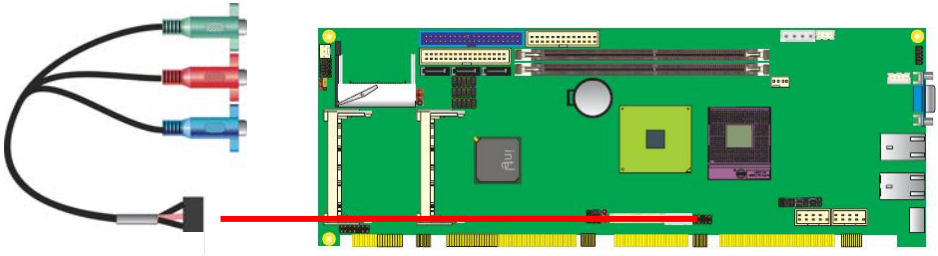
Connector type: 10-pin header HDTV connector (pitch = 2.54mm)

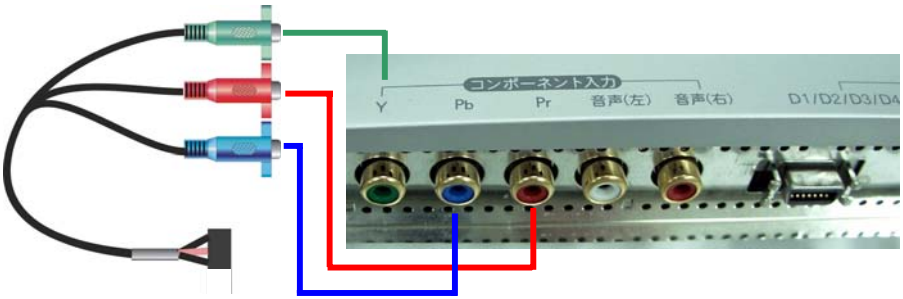
| Pin Number | Assignment | Pin Number | Assignment |
|---|---|---|---|
| 1 | GND | 2 | DACB1 |
| 3 | DACB2 | 4 | N/C |
| 5 | GND | 6 | GND |
| 7 | DACB3 | 8 | N/C |
| 9 | N/C | 10 | N/C |



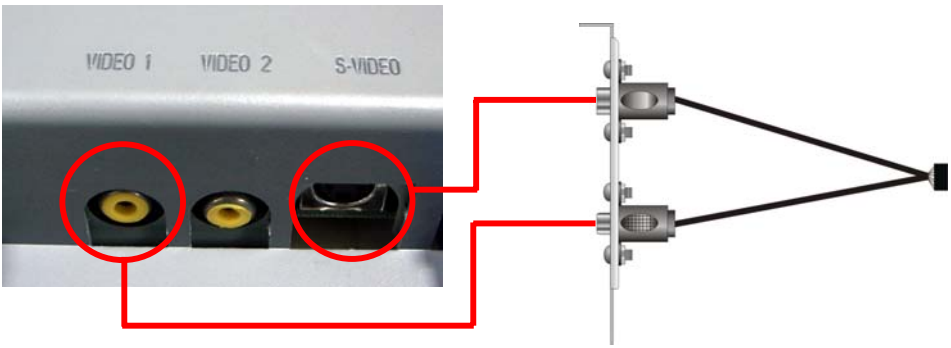
To connect the TV set, please follow the diagram below to setup your system:

**YPrPb Component Cable**
**(For HDTV)**






**S-VIDEO or Composite**



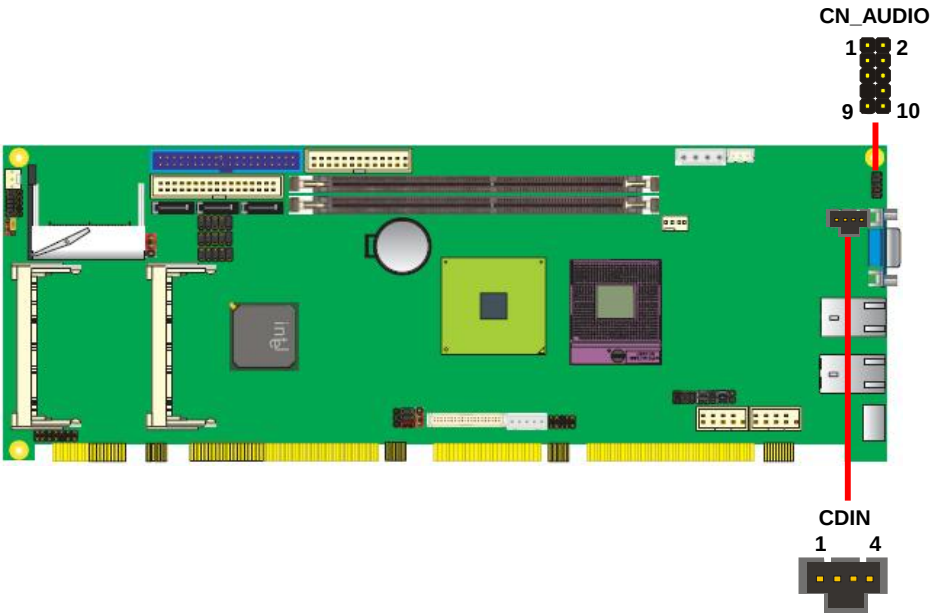
## 2.10 Audio Installation

The board integrates onboard audio interface with REALTEK ALC888 codec, with Intel next generation of Audio standard as High Definition Audio, it offers more sound and other advantages than former HD Audio compliance.

The main specifications of ALC888 are:

- **High-performance DACs with 100dB S/N ratio**
- **8 DAC channels support 16/20/24-bit PCM format for 2 audio solution**
- **Compatible with HD Audio**
- **Meets Microsoft WHQL/WLP 2.0 audio requirements**

The board provides 2 channels speaker and from pin header MIC-in ports through Audio cable.



**Connector: CN_AUDIO**

Type: 10-pin (2 x 5) header (pitch = 2.54mm)

| Pin | Description | Pin | Description |
|---|---|---|---|
| 1 | MIC2_L | 2 | Ground |
| 3 | MIC2_R | 4 | VCC |
| 5 | FP_OUT_R | 6 | MIC2_JD |
| 7 | SENSE | 8 | N/C |
| 9 | FP_OUT_L | 10 | LINE2_JD |

**Connector: CDIN**

Type: 4-pin header (pitch = 2.54mm)

| Pin | Description |
|---|---|
| 1 | CD – Left |
| 2 | Ground |
| 3 | Ground |
| 4 | CD – Right |

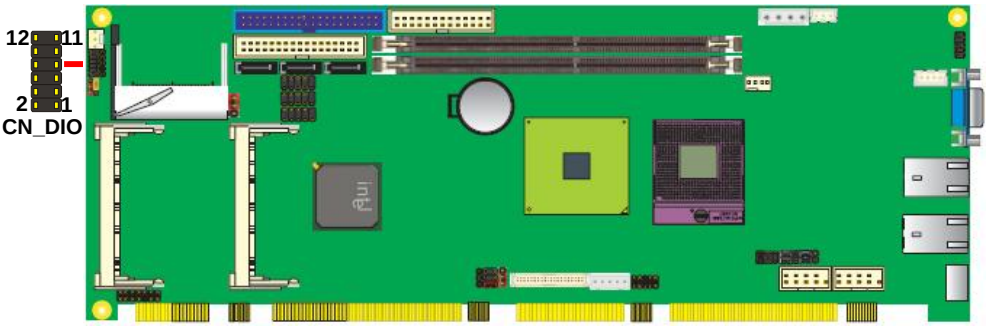
## 2.11 GPIO interface

The board provides a programmable 8-bit digital I/O interface for control panel application.

Connector: **CN_DIO**

Type: onboard 2 x 6-pin header, pitch=2.0mm

| Pin | Description | Pin | Description |
|---|---|---|---|
| 1 | Ground | 2 | Ground |
| 3 | GP10 | 4 | GP14 |
| 5 | GP11 | 6 | GP15 |
| 7 | GP12 | 8 | GP16 |
| 9 | GP13 | 10 | GP17 |
| 11 | VCC | 12 | +12V |

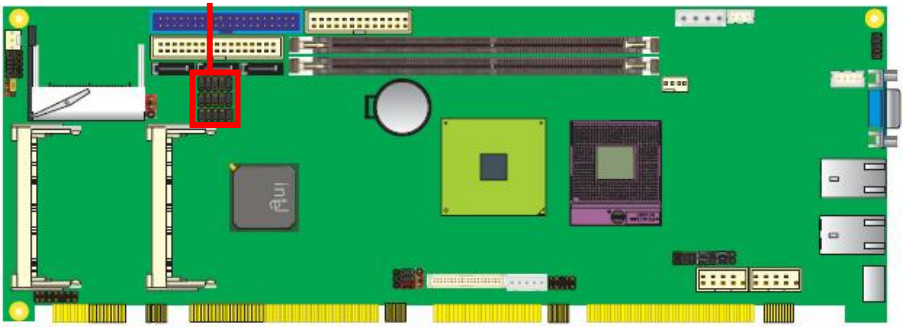


## 2.12 USB2.0 Interface

Based on Intel® ICH8-M, the board provides six USB2.0 ports six on board pin header for on PICMG 1.3 Interface. The USB2.0 interface provides up to 480Mbps of transferring rate.

The Intel® ICH8-M contains two Enhanced Host Controller Interface (EHCI) and five Universal Host Controller Interfaces (UHCI) it can determine whether your connected device is for USB1.1 or USB2.0, and change the transfer rate automatically.

**CN_USB1/2/3**

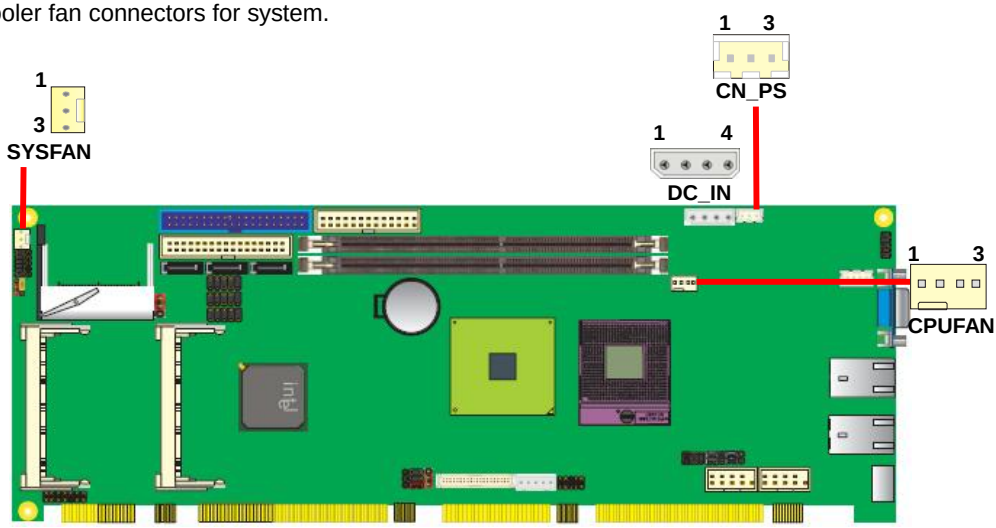


Connector: **CN_USB1/2/3**
Type: 10-pin (5 x 2) header for USB Port

| Pin | Description | Pin | Description |
|---|---|---|---|
| 1 | VCC | 2 | VCC |
| 3 | Data0- | 4 | Data1- |
| 5 | Data0+ | 6 | Data1+ |
| 7 | Ground | 8 | Ground |
| 9 | Ground | 10 | N/C |

## 2.12 Power and Fan Installation

The **TR-990** provides a standard ATX power supply with **4-pin** ATX connector , and the board provides one **4-pin** fan connector supporting smart fan for CPU cooler and two 3-pin cooler fan connectors for system.




Connector: **DC_IN**

Type: 4-pin P-type connector for +5V/+12V input

| Pin | Description | Pin | Description | Pin | Description | Pin | Description |
|---|---|---|---|---|---|---|---|
| 1 | +12V | 2 | Ground | 3 | Ground | 4 | +5V |

Connector: **CN_PS**

Type: 3-pin ATX function connector

| Pin | Description | Pin | Description | Pin | Description |
|---|---|---|---|---|---|
| 1 | 5V Standby | 2 | Ground | 3 | Power On |

Connector: **CPUFAN**

Type: 4-pin fan wafer connector

| Pin | Description | Pin | Description | Pin | Description | Pin | Description |
|---|---|---|---|---|---|---|---|
| 1 | Ground | 2 | +12V | 3 | Fan Speed Detection | 4 | Fan Control |

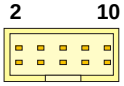
Connector: **SYSFAN**

Type: 3-pin fan wafer connector

| Pin | Description | Pin | Description | Pin | Description |
|---|---|---|---|---|---|
| 1 | Ground | 2 | +12V | 3 | Sense |

## 2.13 Serial Port

The board supports one RS232 serial port and one jumper selectable RS232/422/485 serial ports. The jumper JCSEL1 /2 can let you configure the communicating modes for COM2.



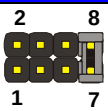

Connector: **CN_COM1/2**

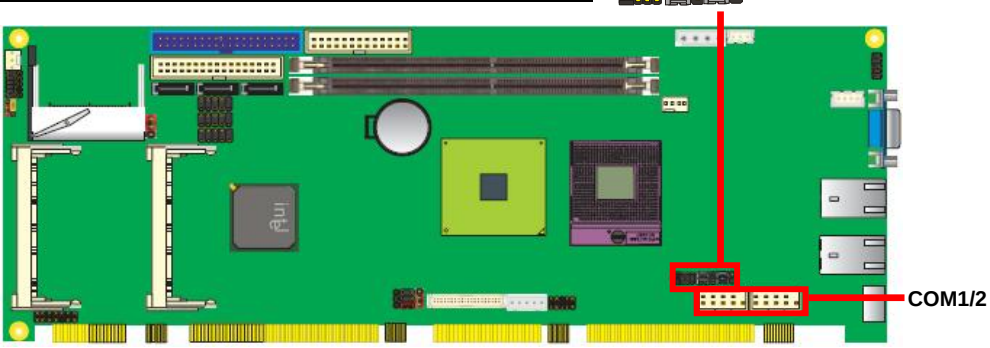
Type: 10-pin (5 x 2) 2.54mm x 2.54mm-pitch header.

| Pin | Description | Pin | Description |
|---|---|---|---|
| 1 | DCD/422RX-/485- | 2 | RXD/422RX+/485+ |
| 3 | TXD/422TX+ | 4 | DTR/422TX- |
| 5 | GND | 6 | DSR |
| 7 | RTS | 8 | CTS |
| 9 | RI | 10 | N/C |

Jumper: **JCSEL1, JCSEL2**

Type: On bond 12-Pin and 8-Pin header

| | JCSEL1 | JCSEL2 |
|---|---|---|
| **SIR** | |   |
| **RS-422** | | |
| **RS-485** | | |
| **RS-232** | | |

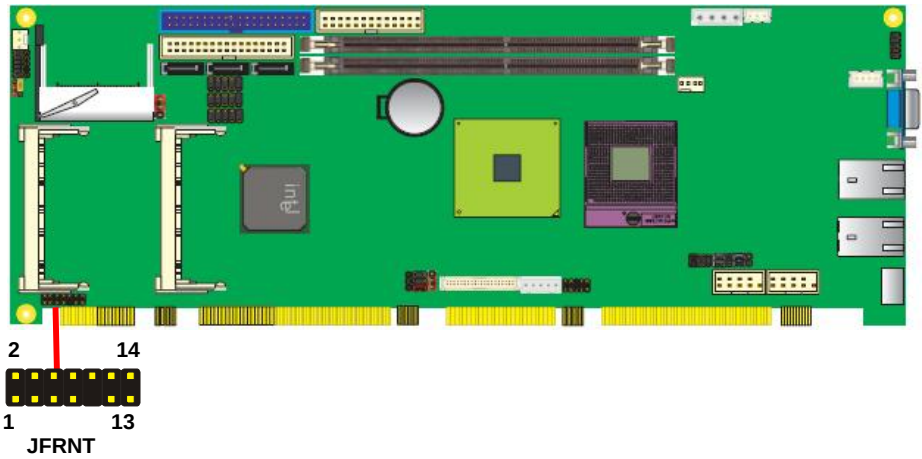


## 2.14 Switch and Indicator

The **JFRNT** provides front control panel of the board, such as power button, reset and beeper, etc. Please check well before you connecting the cables on the chassis.

Connector: **JFRNT**
Type: onboard 14-pin (2 x 7) 2.54-pitch header

| Function | Signal | PIN | | Signal | Function |
|---|---|---|---|---|---|
| **IDE LED** | HDLED+ | 1 | 2 | PWDLED+ | **Power LED** |
| | HDLED- | 3 | 4 | N/C | |
| **Reset** | Reset+ | 5 | 6 | PWDLED- | |
| | Reset- | 7 | 8 | SPKIN+ | **Speaker** |
| | N/C | 9 | 10 | N/C | |
| **Power Button** | PWRBT+ | 11 | 12 | N/C | |
| | PWRBT- | 13 | 14 | SPKIN- | |



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# Chapter 3 - System Configuration

## 3.1 Audio Configuration

The board integrates Intel® ICH8-M with REALTEK ALC888 code. It can support 2-channel sound under system configuration. Please follow the steps below to setup your sound system.

1. Install REALTEK HD Audio driver.

2. Lunch the control panel and Sound Effect Manager.

3. Select Speaker Configuration

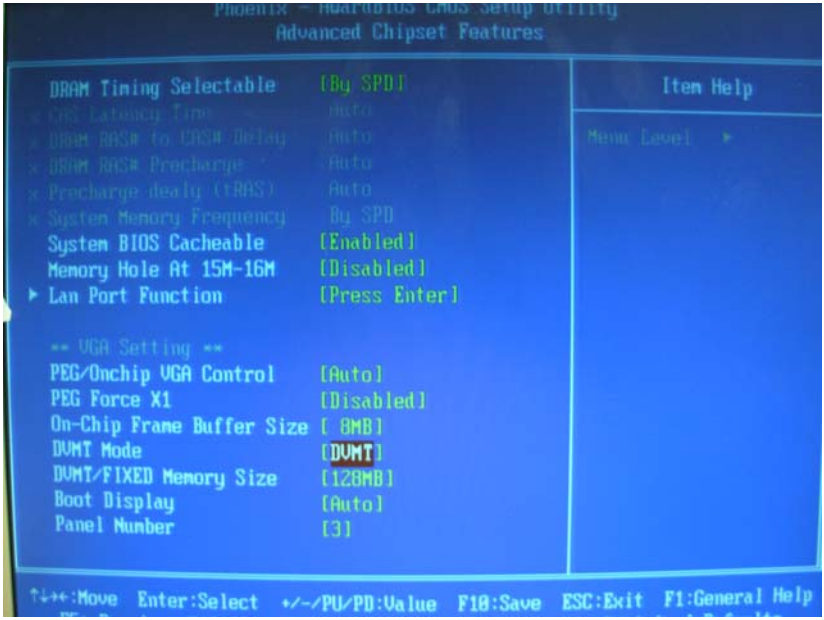
4. Select the sound mode to meet your speaker system.

## 3.2 Video Memory Setup

Based on Intel® GME965 chipset with GMA (Graphic Media Accelerator) X3100, the board supports Intel® DVMT (Dynamic Video Memory Technology) 4.0, which would allow the video memory be triggered up to 384MB.

To support DVMT, you need to install the Intel® GMA X3100 Driver with supported OS.

**BIOS Setup:**




**On-Chip Video Memory Size:** This option combines three items below for setup.

**On-Chip Frame Buffer Size:**

This item can let you select video memory which been allocated for legacy VGA and SVGA graphics support and compatibility. The available option is **1MB** and **8MB**.

**DVMT Mode:**

This item can let you select graphics memory which Fixed or DVMT.

**DVMT/FIXED Memory Size:**

This item can let you select a maximum size of dynamic amount usage of video memory, the system would configure the video memory depends on your application, this item is strongly recommend to be selected as **MAX**.

# Chapter 4 - BIOS Setup

The motherboard uses the Award BIOS for the system configuration. The Award BIOS in the single board computer is a customized version of the industrial standard BIOS for IBM PC AT-compatible computers. It supports Intel x86 and compatible CPU architecture based processors and computers. The BIOS provides critical low-level support for the system central processing, memory and I/O sub-systems.

The BIOS setup program of the single board computer let the customers modify the basic configuration setting. The settings are stored in a dedicated battery-backed memory, NVRAM, retains the information when the power is turned off. If the battery runs out of the power, then the settings of BIOS will come back to the default setting.

The BIOS section of the manual is subject to change without notice and is provided here for reference purpose only. The settings and configurations of the BIOS are current at the time of print, and therefore they may not be exactly the same as that displayed on your screen.

To activate CMOS Setup program, press ＜DEL＞ key immediately after you turn on the system. The following message “Press DEL to enter SETUP” should appear in the lower left hand corner of your screen. When you enter the CMOS Setup Utility, the Main Menu will be displayed as **Figure 4-1**. You can use arrow keys to select your function, press ＜Enter＞ key to accept the selection and enter the sub-menu.

**Figure 4-1** CMOS Setup Utility Main Screen

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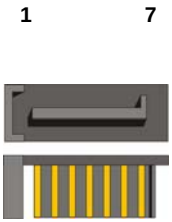
# Appendix A - I/O Port Pin Assignment

## A.1 Serial ATA Port

Connector: **SATA1/2/3**

Type: 7-pin wafer connector




| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| GND | RSATA_TXP1 | RSATA_TXN1 | GND | RSATA_RXN1 | RSATA_RXP1 | GND |

## A.2 IrDA Port

Connector: **CN_IR**

Type: 5-pin header for SIR Port

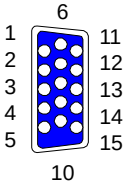
| Pin | Description |
|---|---|
| 1 | Vcc |
| 2 | N/C |
| 3 | IRRX |
| 4 | Ground |
| 5 | IRTX |

***JCSEL1 must jump to "IrDA"***

## A.3 VGA Port

Connector: **CRT**

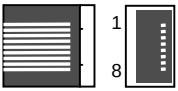
Type: 15-pin D-sub female connector on bracket




| Pin | Description | Pin | Description | Pin | Description |
|---|---|---|---|---|---|
| 1 | RED | 6 | Ground | 11 | N/C |
| 2 | GREEN | 7 | Ground | 12 | DDC_DA |
| 3 | BLUE | 8 | Ground | 13 | HSYNC |
| 4 | N/C | 9 | +5V | 14 | VSYNC |
| 5 | Ground | 10 | Ground | 15 | DDC_CLK |

## A.4 LAN Port

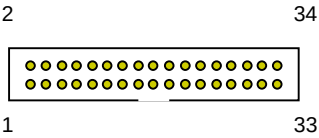
Connector: **RJ45 1/2**
Type: RJ45 connector with LED on bracket




| Pin | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Description | TRD0+ | TRD0- | TRD1+ | TRD2+ | TRD2- | TRD1- | TRD3+ | TRD3- |

## A.5 Floppy Port

Connector: **FDD**
Type: 34-pin (2x 17) 2.54-pitch box header

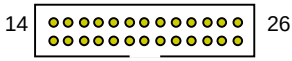



| Pin | Description | Pin | Description |
|---|---|---|---|
| 1 | Ground | 2 | DRIVE DENSITY SELECT 0 |
| 3 | Ground | 4 | DRIVE DENSITY SELECT 1 |
| 5 | Ground | 6 | N/C |
| 7 | Ground | 8 | INDEX- |
| 9 | Ground | 10 | MOTOR ENABLE A- |
| 11 | Ground | 12 | DRIVER SELECT B- |
| 13 | Ground | 14 | DRIVER SELECT A- |
| 15 | Ground | 16 | MOTOR ENABLE B- |
| 17 | Ground | 18 | DIRECTION- |
| 19 | Ground | 20 | STEP- |
| 21 | Ground | 22 | WRITE DATA- |
| 23 | Ground | 24 | WRITE GATE- |
| 25 | Ground | 26 | TRACK 0- |
| 27 | Ground | 28 | WRITE PROTECT- |
| 29 | Ground | 30 | READ DATA- |
| 31 | Ground | 32 | HEAD SELECT- |
| 33 | Ground | 34 | DISK CHANGE- |

## A.6 Parallel Port

Connector: **LPT (PRINTER)**

Type: 26-pin (2 x 13) 2.54-pitch box header




| Pin | Description | Pin | Description |
|---|---|---|---|
| 1 | STROBE- | 14 | AUTO FEED- |
| 2 | D0 | 15 | ERROR- |
| 3 | D1 | 16 | INITIALIZE- |
| 4 | D2 | 17 | SELECT INPUT- |
| 5 | D3 | 18 | Ground |
| 6 | D4 | 19 | Ground |
| 7 | D5 | 20 | Ground |
| 8 | D6 | 21 | Ground |
| 9 | D7 | 22 | Ground |
| 10 | ACKNOWLEDGE- | 23 | Ground |
| 11 | BUSY | 24 | Ground |
| 12 | PAPER EMPTY | 25 | Ground |
| 13 | SELECT+ | 26 | N/C |

# Appedix B - System Resources

## B1. I/O Port Address Map

[00000000 - 0000000F] Direct memory access controller
[00000000 - 00000CF7] PCI bus
[00000010 - 0000001F] Motherboard resources
[00000020 - 00000021] Programmable interrupt controller
[00000022 - 0000003F] Motherboard resources
[00000040 - 00000043] System timer
[00000044 - 0000005F] Motherboard resources
[00000060 - 00000060] Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
[00000061 - 00000061] System speaker
[00000062 - 00000063] Motherboard resources
[00000064 - 00000064] Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
[00000065 - 0000006F] Motherboard resources
[00000070 - 00000073] System CMOS/real time clock
[00000074 - 0000007F] Motherboard resources
[00000080 - 00000090] Direct memory access controller
[00000091 - 00000093] Motherboard resources
[00000094 - 0000009F] Direct memory access controller
[000000A0 - 000000A1] Programmable interrupt controller
[000000A2 - 000000BF] Motherboard resources
[000000C0 - 000000DF] Direct memory access controller
[000000E0 - 000000EF] Motherboard resources
[000000F0 - 000000FF] Numeric data processor
[00000170 - 00000177] Secondary IDE Channel
[000001F0 - 000001F7] Primary IDE Channel
[00000274 - 00000277] ISAPNP Read Data Port
[00000279 - 00000279] ISAPNP Read Data Port
[000002F8 - 000002FF] Communications Port (COM2)
[00000376 - 00000376] Secondary IDE Channel

[00000378 - 0000037F] Printer Port (LPT1)
[000003B0 - 000003BB] Mobile Intel(R) 965 Express Chipset Family
[000003C0 - 000003DF] Mobile Intel(R) 965 Express Chipset Family
[000003F0 - 000003F5] Standard floppy disk controller
[000003F6 - 000003F6] Primary IDE Channel
[000003F7 - 000003F7] Standard floppy disk controller
[000003F8 - 000003FF] Communications Port (COM1)
[00000400 - 000004BF] Motherboard resources
[000004D0 - 000004D1] Motherboard resources
[00000500 - 0000051F] Intel(R) ICH8 Family SMBus Controller - 283E
[00000680 - 000006FF] Motherboard resources
[00000778 - 0000077B] Printer Port (LPT1)
[00000880 - 0000088F] Motherboard resources
[00000A79 - 00000A79] ISAPNP Read Data Port
[00000D00 - 0000FFFF] PCI bus
[0000C000 - 0000CFFF] Intel(R) ICH8 Family PCI Express Root Port 1 - 283F
[0000D000 - 0000DFFF] Intel(R) ICH8 Family PCI Express Root Port 5 - 2847
[0000DF00 - 0000DF1F] Intel(R) PRO/1000 PL Network Connection
[0000F300 - 0000F30F] Intel(R) ICH8M 3 port Serial ATA Storage Controller - 2828
[0000F400 - 0000F40F] Intel(R) ICH8M 3 port Serial ATA Storage Controller - 2828
[0000F500 - 0000F503] Intel(R) ICH8M 3 port Serial ATA Storage Controller - 2828
[0000F600 - 0000F607] Intel(R) ICH8M 3 port Serial ATA Storage Controller - 2828
[0000F700 - 0000F703] Intel(R) ICH8M 3 port Serial ATA Storage Controller - 2828
[0000F800 - 0000F807] Intel(R) ICH8M 3 port Serial ATA Storage Controller - 2828
[0000F900 - 0000F90F] Intel(R) ICH8M Ultra ATA Storage Controllers - 2850
[0000FA00 - 0000FA1F] Intel(R) ICH8 Family USB Universal Host Controller - 2832
[0000FB00 - 0000FB1F] Intel(R) ICH8 Family USB Universal Host Controller - 2831
[0000FC00 - 0000FC1F] Intel(R) ICH8 Family USB Universal Host Controller - 2830
[0000FD00 - 0000FD1F] Intel(R) ICH8 Family USB Universal Host Controller - 2835
[0000FE00 - 0000FE1F] Intel(R) ICH8 Family USB Universal Host Controller - 2834
[0000FF00 - 0000FF07] Mobile Intel(R) 965 Express Chipset Family

## B2. Memory Address Map

[00000000 - 0009FFFF] System board
[000A0000 - 000BFFFF] PCI bus
[000A0000 - 000BFFFF] Mobile Intel(R) 965 Express Chipset Family
[000C0000 - 000DFFFF] PCI bus
[000E0000 - 000EFFFF] System board
[000F0000 - 000FFFFF] System board
[00100000 - 3F6DFFFF] System board
[3F6E0000 - 3F6FFFFF] System board
[3F700000 - FEBFFFFF] PCI bus
[3F700000 - 3F7FFFFF] System board
[D0000000 - DFFFFFFF] Mobile Intel(R) 965 Express Chipset Family
[E0000000 - EFFFFFFF] Motherboard resources
[FD700000 - FD7FFFFF] Mobile Intel(R) 965 Express Chipset Family
[FD9F0000 - FD9FFFFF] Mass Storage Controller
[FDA00000 - FDAFFFFF] Mobile Intel(R) 965 Express Chipset Family
[FDB00000 - FDBFFFFF] Intel(R) ICH8 Family PCI Express Root Port 5 - 2847
[FDC00000 - FDCFFFFF] Intel(R) ICH8 Family PCI Express Root Port 5 - 2847
[FDCE0000 - FDCFFFFF] Intel(R) PRO/1000 PL Network Connection
[FDD00000 - FDDFFFFF] Intel(R) ICH8 Family PCI Express Root Port 1 - 283F
[FDE00000 - FDEFFFFF] Intel(R) ICH8 Family PCI Express Root Port 1 - 283F
[FDFF4000 - FDFF7FFF] Microsoft UAA Bus Driver for High Definition Audio
[FDFFD000 - FDFFD0FF] Intel(R) ICH8 Family SMBus Controller - 283E
[FDFFE000 - FDFFE3FF] Intel(R) ICH8 Family USB2 Enhanced Host Controller - 2836
[FDFFF000 - FDFFF3FF] Intel(R) ICH8 Family USB2 Enhanced Host Controller - 283A
[FEC00000 - FEC00FFF] System board
[FED14000 - FED1DFFF] System board
[FED20000 - FED9FFFF] System board
[FEE00000 - FEE00FFF] System board
[FFB00000 - FFB7FFFF] System board
[FFB80000 - FFBFFFFF] Intel(R) 82802 Firmware Hub Device
[FFF00000 - FFFFFFFF] System board

## B3. System IRQ Resources

| | |
|---|---|
| (ISA) 0 | System timer |
| (ISA) 1 | Standard 101/102-Key or Microsoft Natural PS/2 Keyboard |
| (ISA) 3 | Communications Port (COM2) |
| (ISA) 4 | Communications Port (COM1) |
| (ISA) 6 | Standard floppy disk controller |
| (ISA) 8 | System CMOS/real time clock |
| (ISA) 9 | Microsoft ACPI-Compliant System |
| (ISA) 13 | Numeric data processor |
| (ISA) 14 | Primary IDE Channel |
| (ISA) 15 | Secondary IDE Channel |
| (PCI) 10 | Mass Storage Controller |
| (PCI) 11 | Intel(R) ICH8 Family SMBus Controller - 283E |
| (PCI) 16 | Intel(R) ICH8 Family PCI Express Root Port 1 - 283F |
| (PCI) 16 | Intel(R) ICH8 Family PCI Express Root Port 5 - 2847 |
| (PCI) 16 | Intel(R) ICH8 Family USB Universal Host Controller - 2834 |
| (PCI) 16 | Intel(R) PRO/1000 PL Network Connection |
| (PCI) 16 | Mobile Intel(R) 965 Express Chipset Family |
| (PCI) 18 | Intel(R) ICH8 Family USB Universal Host Controller - 2832 |
| (PCI) 18 | Intel(R) ICH8 Family USB2 Enhanced Host Controller - 283A |
| (PCI) 19 | Intel(R) ICH8 Family USB Universal Host Controller - 2831 |
| (PCI) 19 | Intel(R) ICH8M 3 port Serial ATA Storage Controller - 2828 |
| (PCI) 21 | Intel(R) ICH8 Family USB Universal Host Controller - 2835 |
| (PCI) 22 | Microsoft UAA Bus Driver for High Definition Audio |
| (PCI) 23 | Intel(R) ICH8 Family USB Universal Host Controller - 2830 |
| (PCI) 23 | Intel(R) ICH8 Family USB2 Enhanced Host Controller - 2836 |

# Appedix C - Flash BIOS

## C.1 BIOS Auto Flash Tool

The board is based on Award BIOS and can be updated easily by the BIOS auto flash tool. You can download the tool online at the address below:

http://www.award.com

File name of the tool is “awdflash.exe”, it’s the utility that can write the data into the BIOS flash ship and update the BIOS.

## C.2 Flash Method

1. Please make a bootable floppy disk.
2. Get the last .bin files you want to update and copy it into the disk.
3. Copy awardflash.exe to the disk.
4. Power on the system and flash the BIOS. (Example: C:/ awardflash XXX.bin)
5. Re-star the system.

# Appendix D - Programming GPIO's

The GPIO'can be programmed with the MSDOS debug program using simple IN/OUT commands.The following lines show an example how to do this.

```
GPIO0…..GPIO7   bit0……bit7
-o 2E 87                ;enter configuration
-o 2E 87
-o 2E 07
-o 2F 09                ;enable GPIO function
-o 2E 30
-o 2F 02                ;enable GPIO configuration
-o 2E F0
-o 2F xx                ;set GPIO as input/output; set '1' for input,'0'for
                          output
-o 2E F1
-o 2F xx                ;if set GPIO's as output,in this register its value can
                          be set

Optional :
-o 2E F2
-o 2F xx               ; Data inversion register ; '1' inverts the current valus
                          of the bits ,'0' leaves them as they are
-o 2E 30
-o 2F 02               ; active GPIO's
```

For further information, please refer to Winbond W83627DHG datasheet.

# Appendix E - Watch Dog timer Setting

The watchdog timer makes the system auto-reset while it stops to work for a period. The integrated watchdog timer can be setup as system reset mode by program.

**Timeout Value Range**
- 1 to 255
- Second or Minute

**Program Sample**
Watchdog timer setup as system reset with 5 second of timeout

| | |
|---|---|
| 2E, 87 | |
| 2E, 87 | |
| 2E, 07 | |
| 2F, 08 | Logical Device 8 |
| 2E, 30 | Activate |
| 2F, 01 | |
| 2E, F5 | Set as Second* |
| 2F, 00 | |
| 2E, F6 | Set as 5 |
| 2F, 05 | |

* Minute: bit 3 = 0; Second: bit 3 = 1

You can select Timer setting in the BIOS, after setting the time options, the system will reset according to the period of your selection.